

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: :  
: Wang et al. :  
: :  
Application No. not yet assigned : Art Unit: not yet assigned  
: :  
Filed: herewith : Examiner: not yet assigned  
: :  
For: A METHOD AND CATALYST : Atty Docket: B-1482-DIV  
STRUCTURE FOR STEAM :  
REFORMING OF A :  
HYDROCARBON :

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Applicants submit the following Amendment and Remarks.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary, then such extensions of time are hereby petitioned under 37 CFR § 1.136(a); and any fees required for consideration of this paper and any papers associated with it (including fees for net addition of claims) are hereby authorized to be charged to our Deposit Account No. 02-1275.

## AMENDMENT

Please enter the following amendments:

### IN THE SPECIFICATION

On page 1, line 8, insert:

-- RELATED APPLICATIONS

This is a divisional of U.S. Patent Application Ser. No. 09/375,615, now U.S. Patent No.

\_\_\_\_\_, filed August 17, 1999. --

### IN THE CLAIMS

Cancel claims 1-9 without prejudice or disclaimer.

Please add new claims 10-23 as follows:

- 10. A catalyst structure, comprising:
- (a) a first porous structure comprising a first pore surface area and a first pore size of at least 0.1  $\mu\text{m}$ ;
  - (b) a buffer layer upon the first pore surface area;
  - (c) a porous interfacial layer comprising spinel with a second pore surface area and a second pore size less than the first pore size; the porous interfacial layer having a thickness less than 4 mm, disposed on the buffer layer;
  - (d) a steam reforming catalyst selected from the group consisting of rhodium, iridium, nickel, palladium, platinum, carbide of group IVb and combinations thereof.

11. The catalyst structure of claim 10 wherein the steam reforming catalyst comprises a carbide selected from the group consisting of tungsten carbide, molybdenum carbide, and combinations thereof.

12. The catalyst structure of claim 10 wherein the steam reforming catalyst comprises Rh.

13. A steam reforming catalytic system comprising:

the catalyst of claim 10;

steam and hydrocarbon; and

hydrogen.

14. The catalyst structure of claim 10 wherein the spinel comprises Mg and Al.

15. A steam reforming catalyst structure comprising:

a support comprising a spinel support; and

a steam reforming catalyst selected from the group consisting of rhodium, iridium, nickel, palladium, platinum, carbide of group IVb and combinations thereof;

wherein the catalyst structure has stability such that, when tested in a packed bed at 900°C, with a feedstream consisting essentially of methane and steam at a 1:1 ratio of methane to steam, at a constant pressure and a contact time such that there is a hydrocarbon conversion of at least 50%, and measuring the CO selectivity, wherein between about 26 hours time-on-stream and about 40

hours time-on-stream, the CO selectivity remains essentially unchanged and the hydrocarbon absolute conversion changes less than about 5%.

16. The catalyst structure of claim 15 wherein the steam reforming catalyst is selected from the group consisting of rhodium, iridium, nickel, palladium, and platinum.

17. The catalyst structure of claim 16 wherein the catalyst structure has stability such that, when tested in a packed bed at 900°C for 40 hours, at a steam to carbon ratio of 1:1 and a contact time of 25 msec, no coke deposition is revealed by electron microscopic examination.

18. The catalyst structure of claim 16 wherein the catalyst structure has stability such that, when tested in a packed bed at 900°C for 40 hours, at a steam to carbon ratio of 1:1 and a contact time of 25 msec, BET measurements detect no significant loss in surface area.

19. The catalyst structure of claim 16 made by:  
impregnating an alumina support with magnesia;  
calcining; and  
impregnating with a catalyst metal.

20. The catalyst structure of claim 16 further comprising a magnesia passivation layer disposed on the spinel.

21. The catalyst structure of claim 20 wherein a steam reforming catalyst is impregnated into the magnesia passivation layer.

22. The catalyst structure of claim 21 wherein the steam reforming catalyst comprises Rh.

23. The catalyst structure of claim 15 wherein when said catalyst structure is tested between 26 hours time-on-stream and 40 hours time-on-stream under the conditions recited in claim 15, the CO selectivity changes by 3% or less. --

### REMARKS

Claims 1-9 have been canceled. New claims 10-23 have been added. Support for the new claims can be found at page 2 and elsewhere in the specification.

If the Examiner has any questions or would like to speak to Applicants' representative, the Examiner is encouraged to call Applicants' attorney at the number provided below.

Respectfully submitted,

Date: 8-14-01

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